REMARKS

Claims 1-21, 24-27, and 37-43 are currently pending in the present application and are presently under consideration. All pending claims with status identifiers are found at pages 2-6.

Favorable reconsideration is requested in view of the comments below.

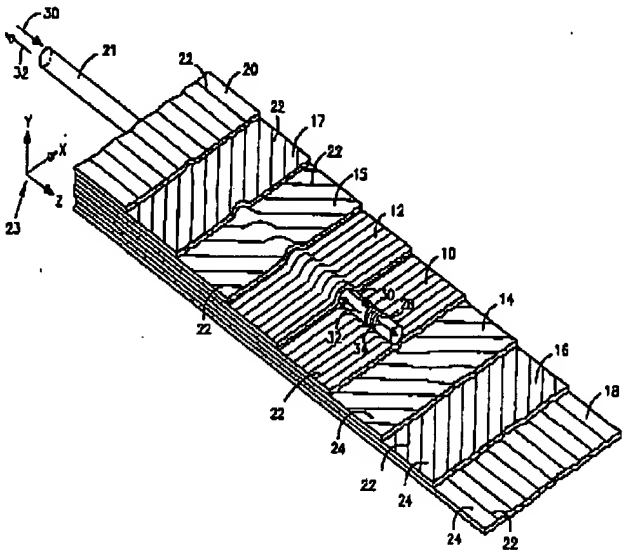
I. Rejection of Claims 1-12, 14-21, and 24-27 under 35 U.S.C. §103(a)

Claims 1-12, 14-21, and 24-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dunphy, *et al.* (U.S. 5,399,854) in view of Kersey, *et al.* (U.S. Patent 5,361,130) and Thomas, *et al.* (U.S. 4,460,893). Reconsideration and allowance of claims 1-12, 14-21, and 24-27 is respectfully requested for at least the following reasons. There is no suggestion or motivation to combine Dunphy, *et al.*, Kersey, *et al.*, and Thomas, *et al.* Further, the cited references, individually or in combination, do not teach or suggest all the limitations of the claimed invention.

> To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, ***there must be some suggestion or motivation***, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, ***to modify the reference or to combine reference teachings***. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) ***must teach or suggest all the claim limitations***. *See* MPEP §706.02(j) (emphasis added). The teaching or suggestion to make the claimed combination and the reasonable expectation of success ***must both be found in the prior art and not based on applicant's disclosure***. *See In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

With respect to independent claims 1, 16, and 24, Dunphy, *et al.*, Kersey, *et al.*, and Thomas, *et al.*, alone or in combination, do not disclose, teach, or suggest an ***optical fiber embedded in a bearing*** as claimed. The Examiner has attempted to combine an optical sensor disclosed in Dunphy, *et al.* (and shown below) with a system for detecting

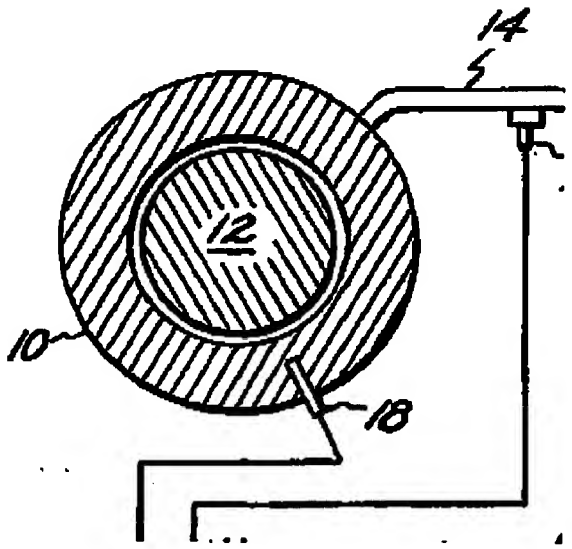
metal-to-metal contact in a journal bearing disclosed in Thomas, *et al.* (and shown below). It is easily discernable upon review of the below figures that there exists no motivation in either Dunphy, *et al.* or Thomas, *et al.* to ***embed an optical fiber in a bearing*** as recited in independent claims 1, 16, and 24.



The Examiner cites the above figure from Dunphy, *et al.* as illustrating "at least one optical fiber (21) embedded in a sample to be measured." As shown in the above figure, however, the "sample to be measured" must include a plurality of layers (10), (12), (14), (15), (16), (17), (18), and (20), wherein the aforementioned layers must include filaments (22) to enable the optical fiber (21) to be employed in connection with measuring stress, strain, temperature, *etc.* relating to the layers. In between such filaments (22) reside regions of polymer matrix (24), described as "a thermal set epoxy resin." (*See* col. 4, lines 10-11). The filaments (22) must be arranged in particular manners for the illustrated sensor to operate properly. (*See* col. 4, lines 33-46). Upon alterations of stress upon the sensor, a strong differential strain is imposed upon the optical fiber *via* the filaments, and a birefringence is induced within a portion of the optical fiber (*e.g.*, a grating (28)). Likewise, an alteration in temperature associated with the optical sensor induces birefringence within the optical fiber (21). This birefringence can be monitored to determine stress and/or temperature relating to the optical sensor.

Such a plurality of layers with filaments arranged in particular a particular manner as illustrated above is not existent with bearings – such an arrangement would render production of bearings as being quite expensive. Accordingly, while the above displayed figure illustrates an optical fiber (21) embedded within a plurality of layers, such optical fiber (21) is not associated with a bearing as claimed, and it is not taught or suggested within Dunphy, *et al.* that the optical fiber (21) can be associated with a bearing.

Like Dunphy, *et al.*, Thomas, *et al.* does not disclose, teach, or suggest ***providing a bearing having an optical fiber embedded therein*** as recited in the subject claims. Rather, as shown below, Thomas, *et al.* simply discloses mounting a thermocouple in a bearing.



The thermocouple (18) is mounted in the bearing (10) (which carries a rotating journal (12)) to monitor temperature of such bearing (10) proximate to a maximum load-bearing point. Oil is delivered through a supply conduit (14) based at least in part upon the temperature measured by the thermocouple (18). There is no mention anywhere in Thomas, *et al.*, however, that the thermocouple (18) can be replaced by an optical fiber, wherein the ***optical fiber provides a measuring system with information relating to at least one condition of a bearing*** as claimed. To provide motivation to replace the

thermocouple (18) with an optical sensor, the Examiner broadly states that "at the time of the invention, one of ordinary skill in the art would have replaced the sensor of Thomas with the fiber optic sensor of Dunphy in order to have a simpler sensor having a wider range of temperature measurement, and also measures temperature more accurately." The Examiner, however, has failed to indicate where *in the cited references* the above motivation is found. Furthermore, the optical sensor of Dunphy, *et al.* requires multiple layers with specifically arranged filaments therein to enable operation, and cannot be generally labeled as "simpler" than the thermocouple (18) of Thomas, *et al.* Moreover, the Examiner has failed to indicate where *in the cited references* that there is any indication that the optic sensor of Dunphy, *et al.* has a wider range of temperature measurement than the thermocouple (18) disclosed in Thomas, *et al.* The Examiner is again reminded that there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. (*See In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)) (emphasis added).

As stated in previous communications with the Examiner, Kersey, *et al.* teaches an optical system that senses changes in environmental conditions or physical phenomena. Kersey, *et al.* employs an optical fiber to provide broadband light to a sensor, which measures environmental conditions or physical phenomena according to the received light wave. The sensor then relays sensed parameters in the form of a return light wave to a signal processor, which determines a measurement value based at least in part upon the returned light wave. Like Dunphy, *et al.*, Kersey, *et al.* fails to teach or suggest an ***optical fiber embedded in a bearing*** as recited in these claims. Moreover, Kersey, *et al.* provides no motivation for ***embedding an optical fiber in a bearing***.

Similarly, the cited references do not disclose, teach, or suggest ***an end of an optical fiber being flush with a contacting surface of a bearing,*** and similarly there lacks motivation *within such references* to place ***an optical fiber flush with a contacting surface of a bearing*** as claimed. The Examiner states that it would be desirable to place the sensor as close as possible to a load bearing point. This may be true – however, a thermocouple placed flush with a contacting surface of a bearing would render such thermocouple inoperable. Therefore, while it may be desirable to place the sensor "in

close proximity to the maximum load-bearing point", Thomas, *et al.* does not disclose, teach, or suggest that a sensor be placed ***flush with a contacting surface of the bearing*** as claimed. (*See* col. 3, lines 30-33). Similarly, Dunphy, *et al.* nowhere teaches that the disclosed optical sensor be placed ***flush with a contacting surface of a bearing*** as recited in independent claim 16. In particular, no part of the optical fiber (21) illustrated in Dunphy, *et al.* can be placed ***flush with a contacting surface of a bearing*** while maintaining desirable operation of the sensor, as a first end of the optical fiber (21) receives and emits light, and a second end is associated with a grating (28). If the grating (28) is placed flush with a contact surface of a bearing, then such grating (28) may be damaged, and render the optical sensor inoperable. Accordingly, there is no motivation *within the cited references* to place ***an optical fiber being flush with a contacting surface of a bearing.***

Therefore, in view of at least the above, it is readily apparent that the rejection of independent claims 1, 16, and 24, and dependent claims 2-11, 17-21, and 25-26, which respectively depend therefrom, should be withdrawn.

II. Rejection of Claims 13, 27, and 37-43 under 35 U.S.C. §103(a)

Claims 13, 27, and 37-43 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dunphy, *et al.* in view of Kersey, *et al.* and Thomas, *et al.* and further in view of Ide (US Patent 5,382,097). Reconsideration and allowance of claims 13, 27, and 37-43 is respectfully requested for at least the following reasons. Claims 13 and 27 depend upon independent claims 1 and 24, which are believed to be in condition for allowance. Accordingly, this rejection is moot. Independent claim 37, like independent claims 1, 16, and 24, includes ***an optical fiber embedded in a bearing*** as an element. Ide is directed towards a thrust bearing that includes a carrier and a number of bearing pads supported in the carrier. Ide, like Dunphy, *et al.*, Kersey, *et al*, and Thomas, *et al.*, fails to teach or suggest ***an optical fiber imbedded in a bearing*** as recited in independent claim 37. Accordingly, this rejection should be withdrawn.

III. Conclusion

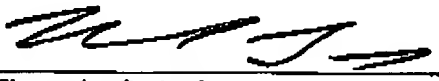
The present application is believed to be condition for allowance in view of the above comments. A prompt action to such end is earnestly solicited.

In the event any additional fees are due in connection with this document beyond those covered by the attached credit card payment form, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063.

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicant's undersigned representative at the telephone number listed below.

Respectfully submitted,

AMIN & TUROCY, LLP



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